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Dated: February 1, 2006

Signature: *Jeffrey S. Sharp*

(Jeffrey S. Sharp)

27W:  
AF

Docket No.: 28911/36128  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:

**Alison HOPKINS**

Application No.: 09/485,245

Group Art Unit: 1637

Filed: March 27, 2000

Examiner: C. Wilder

For: COMPOSITIONS COMPRISING RANDOM  
MIXTURES OF OLIGONUCLEOTIDES

**REPLY BRIEF ON APPEAL**

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to the receipt of an Examiner's Answer mailed December 1, 2005 in the above application, the Appellant respectfully submits the following Reply Brief in accordance with 37 C.F.R. § 41.41. This Reply Brief is timely filed on February 1, 2006. If any fees are deemed necessary, the Commissioner is authorized to charge fees to Marshall, Gerstein & Borun LLP account number 13-2855.

**I. STATUS OF CLAIMS**

**A. Total Number of Claims in Application**

There are a total of 8 claims pending in the application. These claims are claims 7-14 as attached hereto as Appendix A. Claims 1-6 were cancelled during prosecution.

**B. Current Status of Claims**

1. Claims canceled: 1-6
2. Claims withdrawn from consideration but not canceled: none
3. Claims pending: 7-14
4. Claims allowed: none
5. Claims rejected: 7-14.

**C. Claims On Appeal**

The claims on appeal are claims 7-14.

## **II. GROUNDS OF OBJECTION TO BE REVIEWED ON APPEAL**

The issues presented on appeal are as follows:

(a) Whether the Examiner erred as a matter of law in maintaining an obviousness rejection of claims 7-10 and 11-14 over Godiska, U.S. 5,759,804, in view of Shen, EP 0 726 310, in the face of evidence demonstrating unexpected results over the art, because Applicant's claims do not recite the unexpected results and do not contain limitations "that would suggest that such [unexpected] results were achieved," (Office Action of 7/12/04, page 5, lines 14-15).

(b) Whether claims 7-10 fail to comply with the written description requirement under 35 U.S.C. §112, first paragraph.

### III. REPLY

#### A. THE EXAMINER'S REJECTION UNDER 35 U.S.C. §103 AND §112 FIRST PARAGRAPH, LIES IN THE IMPROPER CONSTRUCTION OF THE TERM "RESISTANT."

The Examiner's principle argument for maintaining both the §103 and §112 rejections, relates to the use of the term "resistant" rather than "reduction" in the claims.

It is undisputed that Appellants' invention is novel over the art, including the cited Godiska and Shen references, neither of which individually discloses the elements of the appealed claims. Further, Appellants have rebutted the obviousness rejection based on the combination of elements of Godiska and Shen by demonstrating unexpected improvements with respect to the resistance to self-annealing of their random mixture of oligonucleotides.

The Examiner's Answer does not dispute Appellants' demonstration of improvements with respect to self-annealing, and the Examiner acknowledges that Appellants' specification:

"...shows that there in (sic) a reduction in self-annealing when the random mixture of dried oligonucleotides 6-mer to 8-mer are utilized as a labeling composition." (Answer page 3, lines 4-5)

Therefore, the Examiner's only remaining criticism of Appellants' claims under 35 U.S.C. §§103 and 112 (first paragraph, written description) is the choice of the phrase "resistant to self-annealing" rather than "reduction in self-annealing."<sup>1</sup>

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<sup>1</sup> The Examiner maintains the §103 obviousness rejection because the results only show "a reduction in self-annealing not a total resistance of self-annealing" (Answer page 10, line 9, emphasis the Examiner's) and maintains the §112 written description rejection on the same basis (Answer, page 14, lines 14-17).

By this reading, the Examiner improperly, and contrary to the teaching of Appellants' disclosure, implies a standard of absolute inalterability. Such a reading is contrary to the plain meaning and usage of "resistant." "Resistance" is defined as "a force that tends to oppose or retard motion", (Webster's II New College Dictionary, Houghton Mifflin Company, New York, NY, 2001, p.943, See also The Academic Press Dictionary of Science and Technology, p. 1839 (Academic Press Inc., San Diego, CA 1992)). Thus, a time-piece which is "water resistant" is not absolutely impervious to penetration by water; rather it retards or diminishes the damaging effect of moisture. (Compare with water-proof.)<sup>2</sup>

Similarly, the primers described herein are resistant, but not impervious to self-annealing. The primers herein demonstrate a significant and unexpected retarding of self-annealing compared to the prior art primers. One of ordinary skill in the art reviewing Appellant's specification, including the acknowledged reduction in self-annealing of Appellants' primer composition, would have recognized that such was the intended meaning.

Given the Examiner's clarification of the rationale behind the two remaining rejections it is clear that both of those remaining rejections should be reversed and each of appealed claims 7-14 be allowed.

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<sup>2</sup> The Academic Press Dictionary of Science and Technology, p. 2354 (Academic Press Inc., San Diego, CA 1992) equates "water resistant" with "water repellent" which is defined as "resistant but not impervious to water." This is contrasted with "waterproof" which is defined as "impervious to water."

**IV. CLAIMS**

A copy of the claims involved in the appeal is attached hereto as Appendix A.

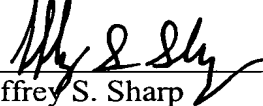
**V. EXHIBITS**

Copies of the exhibits cited in the appeal are attached hereto as Appendix B.

Respectfully submitted,

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February 1, 2006

**APPENDIX A**

**Claims Involved in the Appeal of Application Serial No: 09/485,245**

7. A method of forming a random mixture of oligonucleotides which is resistant to self-annealing comprising the steps of selecting a random mixture of oligonucleotides which are 6-mers to 8-mers and drying said mixture.

8. The method of claim 7 wherein the mixture is dried by freeze-drying.

9. The method of claim 7 wherein the mixture also contains at least one of: a polymerase enzyme; a supply of nucleotides for chain extension; a labeled nucleotide; a dye; a stabilizer; and a buffer.

10. The method of claim 7 wherein the random mixture of oligonucleotides is of 6-mer oligonucleotides.

11. In a method of forming a random mixture of oligonucleotides the improvement comprising the steps of selecting a random mixture of oligonucleotides which are 6-mers to 8-mers and drying said mixture.

12. The method of claim 11 wherein the mixture is dried by freeze-drying.

13. The method of claim 11 wherein the mixture also contains at least one of: a polymerase enzyme; a supply of nucleotides for chain extension; a labeled nucleotide; a dye; a stabilizer; and a buffer.

14. The method of claim 11 wherein the random mixture of oligonucleotides is of 6-mer oligonucleotides.

**APPENDIX B**

Webster's II New College Dictionary, p. 943 (Houghton Mifflin Company, New York, NY, 2001)

The Academic Press Dictionary of Science and Technology, pp. 1839, 2354 (Academic Press Inc., San Diego, CA, 1992)



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# Webster's II

*New College Dictionary*



Houghton Mifflin Company

*Boston • New York*

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**re-seg-ration** (rē-ség' rī-gā'shən) *n.* A renewal of segregation, as in a school system, after a period of desegregation.

**re-sim-bance** (rī-zēm'blāns) *n.* 1. Similarity in nature, form, or appearance. 2. Something similar to another: LIKENESS.

**re-sim-bile** (rī-zēm'bal) *vt.* -bled, -bling, -bles. [ME *resemblen* < OFr. *resembler* < *re-* (intensive < Lat.) + *sembler*, to be like < Lat. *simulare*, to imitate < *similis*, like.] To have a similarity to <a child who resembles its parents> — **re-sim-bler** *n.*

**re-sent** (rī-zēnt') *vt.* -sent-ed, -sent-ing, -sents. [Obs. Fr. *re-sentir*, to feel strongly: *re-* (intensive) + *sentir*, to feel < Lat. *sentire*.] To feel indignantly aggrieved at.

**re-sent-ful** (rī-zēnt'fəl) *adj.* Full of deep hostility due to a real or imagined offense. — **re-sent'ful-ly** *adv.* — **re-sent'ful-ness** *n.*

*syns:* RESENTFUL, ACRIMONIOUS, BITTER, EMBITTERED *adj.* *core meaning:* feeling or expressing deep hostility due to a real or imagined offense <resentful for having been excluded from the group>

**re-sent-ment** (rī-zēnt'mənt) *n.* Indignation or ill will felt as a result of a real or imagined offense.

**re-ser-pine** (rī-sūr'pēn', -pln, rēs'ar-pln, -pēn', rēz'-) *n.* [G. *Reserpin* < NLat. *Rauwolfia serpentina*, species of snakeroot: RAUWOLFIA, Lat. *serpentina*, fem. of *serpentinus*, serpentine < Lat. *serpere*, to creep.] A white to yellowish powder, C<sub>33</sub>H<sub>40</sub>N<sub>2</sub>O<sub>9</sub>, isolated from the bark of certain species of *rauwolfia* and used as a tranquilizer and sedative.

**re-ser-va-tion** (rēz'ar-vā'shən) *n.* 1. An act of reserving. 2. Something reserved. 3. A limiting qualification, condition, or exception. 4. Land set apart for a special purpose, esp. one for the use of an American Indian people. 5. a. An arrangement for securing accommodations and time, as in a hotel. b. Accommodations so secured. c. The word or promise of such an arrangement.

*syns:* RESERVATION, PRESERVE, RESERVE *n.* *core meaning:* public land kept for a special purpose <a wildlife reservation>

**re-serve** (rī-zūrv') *vt.* -served, -serv-ing, -serves. [ME *re-servare* < OFr. *reserver* < Lat. *reservare*, to keep back: *re-*, back + *servare*, to keep.] 1. To save for future use or a special purpose. 2. To set apart for a specific person or use. 3. To keep or secure for oneself.

*syns:* 1. To reserve the right to object. — *n.* 1. Something saved for future use or a special purpose. 2. An act of reserving. 3. The keeping of one's feelings, thoughts, or affections to oneself. 4. Self-restraint in expression: RETICENCE. 5. Skeptical caution. 6. An amount of capital held back from investment by a bank or company in order to meet possible or probable demands. 7. A reservation of public land <a grazing reserve> 8. often *reserves*. a. A fighting force kept uncommitted and strategic need arises. b. The part of a country's armed forces not on active duty but subject to emergency call-up. — **re-serv'a-ble** *adj.* — **re-serv'er** *n.*

**reserve bank** *n.* A central bank holding other banks' reserves.

**re-served** (rī-zūrvd') *adj.* 1. Kept back or set aside. 2. Self-restrained in behavior and expression. — **re-serv'ed-ly** (zūrv'vīd-lē) *adv.* — **re-serv'ed-ness** *n.*

**re-serv-ist** (rī-zūrv'vist) *n.* A member of a military reserve.

**re-serv-oir** (rēz'ar-vwār', -vōr', -vōr') *n.* [Fr. *réservoir* < *réserver*, to reserve.] 1. A body of water collected and stored for future use in a natural or artificial lake. 2. A receptacle for storing a fluid. 3. Anat. A large supply: RESERVE <a reservoir of good will>

**re-set** (rē-sēt') *vt.* -set, -set-ting, -sets. 1. To set again <reset a watch> 2. To change the reading of <reset an odometer> — *n.* 1. An act of resetting. 2. Something reset. — **re-set'table** *adj.* — **re-set'ter** *n.*

**re-set-tae** (rās'gēs'tī, rēz'jēs'tē) *pl.n.* [Lat., things done.] 1. Things done: DEEDS. 2. Law: The facts of a particular case that are admissible evidence.

**resh** (rēsh) *n.* [Heb. *rēsh* < *rōsh*, head.] The 20th letter of the Hebrew alphabet. — See table at ALPHABET.

**re-shape** (rē-shāp') *vt.* -shaped, -shap-ing, -shapes. To shape, form, or organize again. — **re-shap'er** *n.*

**re-shuf-fle** (rē-shūf'fl) *vt.* -fled, -fling, -fles. 1. To shuffle again <reshuffling the deck> 2. To organize or arrange anew <The president reshuffled members of the study group> — **re-shuf'fle** *n.*

**res-ide** (rī-zīd') *n.* Informal. Residual oil.

**res-ide** (rī-zīd') *vt.* -sid-ed, -sid-ing, -sides. [ME *residen* < OFr. *resider* < Lat. *residere*, to sit back: *re-*, back + *sedere*, to sit.] 1. To live in a place for a permanent or extended time. 2. To be inherently vested, as a power or right. — **re-sid'er** *n.*

**res-idence** (rēz'ī-dēns, -dēns') *n.* 1. The place in which one lives. 2. The act or a period of residing somewhere. 3. RESIDENCY 1. 4. A person's official home or location. — **in residence**. Committed to live and work in a specific place, often for a particular length of time <a musician in residence on campus>

**res-iden-ty** (rēz'ī-dēn-sē, -dēn'-) *n.* *pl.* -cies. 1. The period during which a physician receives specialized clinical training. 2. a. The office of a colonial resident. b. The sphere of authority of a colonial resident. 1. RESIDENCY 1, 2.

*syns:* re-out th thin th this ū cut ūr urge y young th vision a about, item, edible, gallop, circus

**res-i-dent** (rēz'ī-dənt, -dēnt') *n.* 1. One whose home is in a particular location. 2. A colonial official acting as adviser to the ruler of a protected state, often with quasi-gubernatorial powers. 3. A nonmigratory animal, as a bird. 4. A physician serving a period of residency. — *adj.* 1. Living in a particular location: RESIDING. 2. Living somewhere because of duty or work. 3. Inherently present. 4. Nonmigratory, as an animal.

**res-i-den-tial** (rēz'ī-dēn'shəl) *adj.* 1. Of, pertaining to, or having residence. 2. Of or appropriate for residences <residential sections of the city> — **res'iden-tial-ly** *adv.*

**res-i-den-ti-ar-y** (rēz'ī-dēn'shē-ēr'ē, -shā-rē) *adj.* 1. Having a residence, esp. an official one. 2. Concerning or requiring official residence. — *n.*, *pl.* -ies. 1. A resident. 2. A member of the clergy required to have an official residence.

**re-sid-u-a** (rī-zī'ōō-ə) *n.* *pl.* of RESIDUUM.

**re-sid-u-al** (rī-zī'ōō-əl) *adj.* 1. Of, relating to, or typical of a residue. 2. Left over as a residue. — *n.* 1. The amount remaining at the end of a process: REMAINDER. 2. often *residuals*. A payment made to a performer for each repeat showing of a recorded television show. — **re-sid'u-al-ly** *adv.*

**residual oil** *n.* The low-grade oil products that are left following petroleum distillation.

**re-sid-u-ar-y** (rī-zī'ōō-ēr'ē) *adj.* 1. Of, relating to, or making a residue. 2. Law. Entitled to the residue of an estate.

**re-si-due** (rēz'ī-dōō', -dyōō') *n.* [ME < OFr. *residu* < Lat. *residuum*, neuter of *residuus*, remaining < *residere*, to sit back. — see RESIDE.] 1. The remainder of something after removal of a part. 2. Matter left after completion of an abstractive chemical or physical process, such as evaporation, combustion, distillation, or filtration. 3. Law. The remainder of a testator's estate following satisfaction of all claims, debts, and bequests.

**re-sid-u-um** (rī-zī'ōō-əm) *n.*, *pl.* -u-a (-ōō-ə) [Lat., residue.] 1. RESIDUE 1. 2. Law. RESIDUE 3.

**re-sign** (rī-zīn') *v.* -signed, -sign-ing, -signs. [ME *resigner* < OFr. *resigner* < Lat. *resignare*, to unseal: *re-* (reversal) + *signare*, to seal < *signum*, mark.] — *vt.* 1. To submit (oneself) passively: accept as unavoidable. 2. To give up (a position), esp. by formal notification: QUIT. 3. To relinquish (a right, privilege, or claim). — *vi.* To give up one's job or office, esp. by formal notification: QUIT. — **re-sign'er** *n.*

**re-sign** (rē-sīn') *vt.* -signed, -sign-ing, -signs. To sign again.

**res-ig-na-tion** (rēz'īg-nā'shən) *n.* 1. a. An act or instance of resigning. b. An oral or written statement that one is resigning a position or office. 2. Passive acceptance.

**re-signed** (rī-zīnd') *adj.* Feeling or marked by resignation. — **re-sign'ed-ly** (zī'vīd-lē) *adv.* — **re-sign'ed-ness** *n.*

**re-sile** (rī-zīl') *vi.* -siled, -sil-ing, -siles. [Lat. *resilire*, to leap back: *re-*, back + *salire*, to leap.] To spring back, esp. to resume a former position or shape after having been stretched or pressed.

**re-sil-i-ence** (rī-zīl'yəns) also **re-sil-i-en-cy** (-yən-sē) *n.* 1. Ability to recover rapidly from illness, change, or misfortune: BUOYANCY. 2. The property of a material that enables it to regain its original shape or position after being bent, stretched, or compressed: ELASTICITY. — **re-sil'ient** *adj.* — **re-sil'ient-ly** *adv.*

**res-in** (rēz'in) *n.* [ME < OFr. *resine* < Lat. *resina*.] 1. Any of numerous clear to translucent yellow or brown solid or semisolid viscous substances of plant origin, as copal, rosin, and amber, used chiefly in lacquers, varnishes, inks, adhesives, synthetic plastics, and pharmaceuticals. 2. Any of numerous physically similar polymerized synthetics or chemically modified natural resins including thermoplastic materials, as polyvinyl, polystyrene, and polyethylene, and thermosetting materials, as polyesters, epoxies, and silicones, that are used with fillers, stabilizers, pigments, and other components to form plastics. — *vt.* -ined, -in-ing, -ins. To treat or rub with resin. — **res'in-ous** (rēz'ō-nəs) *adj.*

**res-in-ate** (rēz'ō-nāt') *vt.* -at-ed, -at-ing, -ates. To impregnate, permeate, or flavor with resin.

**resin canal** *n.* A tubular intercellular space with resin-secreting cells, often found in gymnosperms.

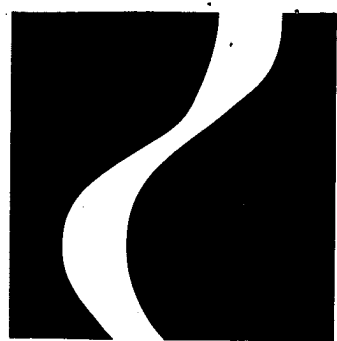
**res-in-if-er-ous** (rēz'ō-nīf'ar-əs) *adj.* Yielding resin.

**res-in-oid** (rēz'ō-nōid') *adj.* Typical of, relating to, or containing resin. — *n.* A resinoid synthetic, esp. a thermosetting resin.

**re-sist** (rī-zīst') *v.* -sist-ed, -sist-ing, -sists. [ME *resisten* < Lat. *resistere*: *re-*, against + *sistere*, to place.] — *vt.* 1. a. To oppose actively. b. To oppose with force. 2. To remain firm in opposing the action or effect of: WITHSTAND. 3. To refrain from giving in to or enjoying <resisted all affection> — *vi.* To offer resistance. — *n.* A substance that can coat and protect a surface, as from corrosion. — **re-sist'er** *n.*

*syns:* RESIST, FIGHT, WITHSTAND *v.* *core meaning:* to oppose actively and with force <Rebels resisted the government troops>

**re-sis-tance** (rī-zīst'āns) *n.* 1. a. An act of resisting. b. Capacity to resist. 2. A force that tends to oppose or retard motion. 3. Elect. Opposition to electric current characteristic of a medium, substance, or circuit element. 4. An underground organization struggling for national liberation in a country under totalitarian control. 5. *Psychoanal.* A process in which the ego opposes the conscious recall of unpleasant experiences. — **re-sis'tant** *adj.*



# Academic Press Dictionary of Science and Technology

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Edited by  
Christopher Morris



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**residual mode** *Control Systems*. a characteristic mode of motion of a structure that is deliberately ignored in the algorithm for an active control system when the model is being refined.

**residual radiation** *Nucleonics*. after a nuclear explosion, remaining radioactivity caused by the presence of fissionable by-products and materials made radioactive by neutron bombardment. Also, *RESTRAHLEN*. *Optics*. the nearly monochromatic infrared radiation remaining after light (or other radiation) is reflected several times by substances such as quartz or fluorite crystals.

**residual range** *Electricity*. the distance over which a particle can still produce ionization after it has lost some of its energy in passing through matter.

**residual resistance** *Solid-State Physics*. the electrical resistance of a metal whose temperature is lowered to almost absolute zero; the resistance existing under this condition is caused by lattice imperfections in the metal.

**residuals** *Statistics*. in regression analysis, the deviations of the actual values of the dependent variable from the values predicted based on the estimated model.

**residual sediment** see RESISTATE.

**residual set** *Mathematics*. a subset of a topological space whose complement is a countable union of nowhere dense sets.

**residual shrinkage** *Textiles*. the percentage of shrinkage that will still occur in a fabric or garment that has been preshrunk.

**residual spectrum** *Mathematics*. let  $T: X \rightarrow X$  be a linear operator on a complex Banach space  $X$ ,  $I$  the identity operator on  $X$ ,  $\lambda$  a complex number, and  $T_\lambda = \lambda I - T$ . Then  $\lambda$  belongs to the residual spectrum of  $T$  if (a)  $T_\lambda^{-1}$  exists, and (b) the domain of  $T_\lambda$  is not dense in  $X$ . If  $\lambda$  does not belong to the residual spectrum of  $T$ , then it belongs to one of the following sets: the resolvent set of  $T$ , the point spectrum of  $T$ , or the continuous spectrum of  $T$ .

**residual stress** *Materials Science*. any stress in a material resulting from nonuniform plastic deformation caused by the more deformed portion pulling on the less deformed one and vice versa; later release of such stresses may cause distortions, and the removal of these stresses is a reason for recovery heat treatments.

**residual swelling** *Geology*. the difference between the prefreezing level of the ground and the level reached by settling after a complete thaw.

**residual valley** *Geology*. a dividing trough between uplifted mountains.

**residual vibration** *Design Engineering*. vibration levels that occur in a machine or process after all known or identifiable sources of vibration are eliminated.

**residual voltage** *Electricity*. the vector sum of the voltages to ground of the multiple phase wires of an electric supply circuit.

**residue** something that is left over; specific uses include: *Agronomy*. plant parts that remain on the soil surface after harvesting. *Geology*. the accumulation of insoluble rock debris left in place after almost all the soluble constituents have been removed by weathering. Also, *RESIDUAL DEPOSIT*. *Chemical Engineering*. any original material remaining after a chemical process or reaction is complete. Also, *RESIDUUM*. *Mathematics*. 1. see QUADRATIC RESIDUE. 2. more generally, an element of a quotient ring; equivalently, a coset of an ideal in a ring. 3. a set  $A$  of integers is called a complete set of residues (modulo  $m$ ) if no two of them are congruent (modulo  $m$ ), and if every integer is congruent to a member of  $A$  (modulo  $m$ ). For example, each of the sets  $\{0, 1, \dots, m-1\}$  and  $\{-3, 2, \dots, m-4\}$  forms a complete set of residues (modulo  $m$ ). 4. let  $f(z)$  be analytic in some domain  $D$ . If  $z_0 \in D$  is a pole or an essential singularity of  $f(z)$ , then the coefficient  $a_{-1}$  of the Laurent expansion at  $z = z_0$  is called the residue of  $f(z)$  at  $z_0$ .

**residue class** *Mathematics*. 1. the solution set of a congruence relation. 2. in particular, the equivalence class induced by the congruence relation  $x \equiv a \pmod{m}$ ; i.e., the set of integers congruent to some integer  $a \pmod{m}$ .

**residue system** *Computer Programming*. a number system in which each digit position has a different radix and all radix pairs are relatively prime.

**residue theorem** *Mathematics*. a theorem stating that if the function  $f$  is analytic in the region  $D$ , except for a finite number of isolated singularities  $a_1, \dots, a_n$ , and if  $\gamma$  is a simple closed rectifiable curve in  $D$  that does not pass through any of the singularities  $a_j$ , then the line integral of  $f$  around  $\gamma$  is equal to  $2\pi i$  times the sum of the residues of  $f$  at each of the singularities  $a_j$ .

**residuum** *Chemical Engineering*. see RESIDUE.

**resilience** *Mechanics*. 1. the ability of a strained body to recover its size and shape after deformation, especially when the strain is produced by compressive stress. Also, *ELASTIC RESILIENCE*. 2. the recoverable potential energy stored in an elastic body when stressed within its elastic limit. *Computer Technology*. the ability of a system to continue to run in the event of a component failure. *Textiles*. also, *resiliency*. the qualities of a fabric that enable it to recover its original shape and size after release from wrinkling or crushing; some fabrics, such as wool and silk, have natural resiliency, and others can be chemically treated to impart a certain amount of resiliency.

**resilin** *Entomology*. a rubbery protein substance found in some insect wing muscles or in leaping muscles like those of the grasshopper; when catch mechanisms are released, energy that is stored and released by resilin helps to project the insect forward.

**resin** [rez'in] *Organic Chemistry*. any one of several solid or semisolid natural or synthetic organic products, usually translucent polymers that do not conduct electricity; used in plastics, textiles, paints, and varnishes.

**resin-anchored bolt** *Engineering*. a roof-bolting technique in which a bolt is anchored in the resin placed at the back of the hole in a glass cartridge that ruptures when the bolt is inserted.

**resin-bonded composite** *Materials*. a material composed of a range of filler types held together by synthetic resin; used for such objects as insulation, molded products, and tools. Similarly, **resin-bonded plywood**.

**resin duct** *Botany*. any of a series of longitudinal canals developed in the secondary vascular system of many gymnosperms for the secretion of resin. Also, **resin canal**.

**resin-in-pulp ion exchange** *Chemical Engineering*. an ion-exchange process that utilizes an anion-exchange resin and a heavy slurry of ground uranium ore in acid-leach liquor to produce ore.

**resinite** *Geology*. a coal maceral of the exinite group consisting of elliptical or spindle-shaped bodies containing resinous compounds.

**resinography** *Chemistry*. the study of the properties and treatment of resins, polymers, and plastics.

**resinoid** *Organic Chemistry*. a thermosetting synthetic resin, in either its fusible state or its final infusible state.

**resin opal** *Mineralogy*. a honey to ochreous-yellow form of common opal, characterized by a resinous luster.

**resinous** *Materials Science*. of or relating to resin or to materials that contain or resemble resin. Thus, **resinous cement**.

**resinous coal** *Geology*. a usually younger coal whose attritus contains a relatively large percentage of resinous material.

**resinous luster** *Mineralogy*. the reflection of light from the surface of a fractured mineral or rock that resembles resin in appearance.

**resin roof bolting** *Mining Engineering*. the use of a bonding resin to secure metal roof bolts into rock holes.

**resin tin** see ROSIN TIN.

**resist** *Materials Science*. a protective coating that prevents a particular reaction. *Graphic Arts*. specifically, a solution of bichromated gum that is applied to a deep-etch offset plate to keep the developing solution from etching nonimage areas. *Metallurgy*. 1. a coating applied to a portion of a material for preventing chemical attack, electrodeposition, or vapor phase deposition. 2. in brazing, a material that selectively prevents the flow of the filler.

**resistance** the fact of opposing or acting against; specific uses include: *Psychology*. 1. an individual's opposition, usually on an unconscious level, to revealing certain psychological material during the course of treatment by an analyst. 2. in Hans Selye's analysis of reaction to stress, the second stage, in which most bodily functions gradually return to normal levels. Also, **resistance stage**. *Virology*. the degree to which a host can limit the effects of an infection, ranging from tolerance, in which symptoms are suppressed, to hypersensitivity, in which only a few cells surrounding the infected cell are affected, to immunity, in which the virus does not multiply due to a lack of susceptible cells. *Mechanics*. the ratio of the frictional forces to the speed of a system under damped harmonic motion. Also, *MECHANICAL RESISTANCE*. *Electricity*. 1. the ratio of applied electromotive force to the resulting current in a circuit; measured in ohms and following Ohm's law. Resistance opposes the flow of current, generates heat, controls electron flow, and helps supply the correct voltage to a device, depending on the material used, the length and cross-sectional area of the conductor, and the temperature. 2. the opposition presented to the flow of direct current by a material or device; measured in ohms, kilohms, or megohms. 3. in an AC circuit, the real component of impedance.

**water-moderated reactor** *Nucleonics*. a reactor in which either ordinary (light) water or heavy water (deuterium oxide) is used as a moderator; in some reactors, water is used both as coolant and as moderator.

**water noise** *Acoustics*. hydrodynamic noise; that is, noise resulting from the flow of water, as in a river or stream, or especially through a restricted volume such as a resonant pipe, producing knocking sounds and other turbulent flow noises.

**water of constitution** *Chemistry*. water that is chemically combined in a compound.

**water of crystallization** *Chemistry*. water that is a physical constituent of certain crystals or hydrated salts; can be removed by heating to leave an anhydrous salt. Also, **water of hydration**.

**water opal** see HYALITE.

**water opening** *Oceanography*. see OPENING.

**water paint** *Materials*. 1. see WATER-BASE PAINT. 2. any paint that can be diluted with water.

**water path** *Engineering*. the distance between an ultrasonic search unit and the test piece in an immersion-type ultrasonic examination.

**water pig** see CAPYBARA.

**water plane** *Naval Architecture*. the plane through a vessel's hull in which its waterline lies.

**water plane area** *Naval Architecture*. the area in vertical-projected cross section of a vessel's water plane.

**water plane coefficient** *Naval Architecture*. the ratio of a vessel's water plane area to that of the rectangle formed by its waterline length and beam.

**water pollution** *Ecology*. a general term for the presence in water of substances, usually chemicals or waste matter introduced by humans, that are harmful to organisms living in the water or to those that drink from it or are otherwise exposed to it.

**water power** *Engineering*. any power that is generated by the force of moving water; for example, in contemporary use, electric power generated through hydraulic turbines; historically, mechanical power from a waterwheel.

**waterproof** *Engineering*. 1. impervious to water. 2. to make impervious to water by treating with a waterproofing agent.

**waterproofing** *Materials*. a waterproofing agent. *Engineering*. the process of making something waterproof.

**waterproofing agent** *Materials*. 1. a substance, such as paint or wax, used to form a water-repellent film on various kinds of surfaces such as cement, metal, or textiles. 2. a metal salt or other chemical that penetrates textile fibers, making them water-repellent but allowing the passage of air through the fabric.

**water purification** *Civil Engineering*. the process of purifying drinking water supplies to ensure safety before the water enters the distribution system.

**water putty** *Mechanical Devices*. a woodwork powder that, when mixed with water, is used as a filler for cracks, nail holes, or other crevices.

**water reducer** *Materials Science*. an admixture agent in concrete, such as lignosulfonate, that provides good workability at lower water-to-cement ratios.

**water regimen** *Hydrology*. see REGIMEN.

**water-repellent** *Engineering*. resistant but not impervious to water. *Materials*. a material having this quality.

**water requirement** *Agriculture*. the total amount of water needed to grow a particular crop under normal field conditions, including both available environmental water and irrigated water.

**water-resistant** see WATER-REPELLENT.

**water rheostat** see LIQUID RHEOSTAT.

**water ring** see GARLAND.

**waters** *Developmental Biology*. a popular name for the amniotic fluid, a liquid that surrounds the fetus during pregnancy.

**water saturation** *Chemistry*. 1. a solid that has absorbed its maximum amount of water under the given conditions. 2. a gas that reaches its dew point due to its water content. 3. a liquid that enters into a second liquid phase after the introduction of more water.

**water scrubber** *Chemical Engineering*. a system or device used to wash away traces of water-soluble components of a gas stream by contacting gases with water through bubbling or spraying.

**water seal** *Materials*. any waterproof sealant. *Engineering*. the seal formed in a trap, a plumbing fixture designed to prevent the flow of air and gases; a bend in the pipe stays full of water, creating the seal.

**water-sealed holder** *Engineering*. a low-pressure gas holder having cylindrical sections that telescope into a tank of water.

**watershed** *Hydrology*. 1. the point of high ground dividing two different drainage systems. 2. the region drained by a specific water system. *Forestry*. a forest that serves as a source of water for rivers and streams by soaking up rain and melted snow in its soil.

**water sky** *Meteorology*. a term used primarily in the polar regions to denote the dark appearance of the underside of a cloud layer occurring over open water; it is darker than land sky.

**water smoke** see STEAM FOG.

**water snake** *Vertebrate Zoology*. any of various snakes living in or around water, particularly any of several harmless snakes of the genus *Natrix*.

**Water Snake** see HYDRUS.

**water snow** *Hydrology*. snow that yields a high content of water when melted.

**water softening** *Chemistry*. the removal of calcium and magnesium ions from hard water, either with chemicals or through ion exchange.

**water-soluble** *Chemistry*. susceptible to dissolving in water. **water-soluble vitamin** *Nutrition*. any vitamin that dissolves in water, such as vitamin C and the vitamin B complex; not stored in the body, water-soluble vitamins are disseminated through blood and body tissues.

**waterspout** *Meteorology*. a tornado or dust devil that occurs over a water surface. *Engineering*. a pipe or orifice that conveys or discharges water.



waterspout

**water swivel** *Mechanical Devices*. a device that connects a water hose to a drill rod, allowing the drill to operate while shavings from the borehole are washed out and the drill bit is cooled. Also, SWIVEL NECK.

**water system** see RIVER SYSTEM.

**water table** *Hydrology*. the upper boundary of the zone of saturation, being the surface of a body of unconfined groundwater at a pressure equal to the pressure of the atmosphere. Also, GROUNDWATER TABLE. *PHREATIC SURFACE*. *Building Engineering*. a projecting string course that is used to divert rainwater from a structure or building.

**water-table cement** or **water-table mound** see GROUNDWATER CEMENT.

**watertight** *Engineering*. designed, fitted, or secured so as to be impervious to water. Thus, **watertight compartment**.

**watertight subdivision** *Naval Architecture*. the subdivision of a vessel into a number of separate watertight compartments, allowing leakage or flooding to be limited to one portion of the vessel.

**water tower** *Civil Engineering*. an elevated water tank that supplies a water distribution system under a gravity pressure head.

**water-transport number** see TRANSFERENCE NUMBER.

**water trap** *Geology*. a section of a cave in which the roof drops below the water level, thus filling the area with water. *Civil Engineering*. see TRAP.

**water treatment** *Biotechnology*. the process of treating sewage or other effluent water sufficiently to permit it to be released into the environment by use of filtration, aeration, bacterial treatment, and so forth.